Amendments to the Claims

1. (currently amended) An optical multiplexing apparatus comprising:
a tunable light source for providing a light beam , the beam having a wavelength that varies periodically through a range of wavelengths at a sweep frequency rate,
a first splitting means for splitting the ~~polarized~~ light beam into a signal beam and a reference beam,
a second splitting means for splitting the signal beam into at least four ~~N~~ sub-beams;
~~means for imparting a different time delay to each of the N sub-beams~~
means for imparting a distinctly different polarization state to each of the sub-beams in order to associate each of the ~~N~~ sub-beams with a different polarization state,
means for recombining the sub-beams with different polarization states into a single optical beam; [[.]]
means for interfering the single optical beam with the reference beam in order to obtain an output light signal, having an ~~whose~~ amplitude which varies ~~is varying~~ in time; [[,]]
and
means for detecting the output light signal and resolving the output signal ~~it~~ into ~~its~~ frequency components thereof;
wherein the time delay for each the ~~N~~ sub-beam is selected such that a unique frequency component of the output light signal is associated with each one of the ~~N~~ different polarization states; and
wherein the at least four sub-beams comprise four sub-beams with four different polarization states comprising linear horizontal, linear diagonal, linear vertical, and right-hand circular.

2. (Cancelled)

3. (currently amended) The apparatus of claim 1, wherein the interfering means comprises an interferometer selected from the group consisting ~~is one~~ of a Mach Zehnder interferometer, a Tyman Green interferometer, a Michelson interferometer, and a Fabry-Perot interferometer. [(]

4. (currently amended) The ~~An~~ apparatus of claim ~~as defined in Claim~~ 1, further comprising ~~further~~ a device under test, wherein the single optical beam is optically coupled to the device under test and the output of the device under test is optically coupled to the interfering means.

5. (Cancelled)

6. (currently amended) A method for measuring optical properties of an optical device, ~~the method~~ comprising the steps of:

(a) providing a light beam of varying frequency from a frequency-tunable light source,

(b) splitting the light beam into a first light beam and a reference light beam,

(c) splitting the first light beam into at least four ~~N~~ sub-beams,

(d) imparting a different time delay to each of the ~~N~~ sub-beams,

(e) imparting a different polarization state to each of the ~~N~~ sub-beams,

(f) recombining the ~~N~~ sub-beams into a single combined light beam containing the supersposition of the ~~N~~ polarization states,

(g) passing the single combined light beam through a device under test to produce a transmitted light beam,

(h) imparting a path length difference between the single combined light beam and the reference light beam,

(i) combining the transmitted light beam and the reference light beam to cause interference therebetween and to produce an output beam containing modulations at beat frequencies associated with the different polarization states, and

(j) analyzing signal levels of the beat frequencies ~~the frequency content~~ of the output beam to determine at least one of polarization dependent loss (PDL) and polarization mode dispersion (PMD) ~~detect optical properties~~ of the device under test .

7. (currently amended) An apparatus for measuring optical properties of an optical device, the apparatus comprising

a frequency-tunable light source,

a beam splitter coupled to receive a light beam from the source and to split the light beam into a signal beam and a reference beam,

an interferometer having at least a first and a second optical paths having different path length, coupled to pass the signal beam through the first path and the reference beam through the second path,

a second beam splitter disposed in the first path to split the signal beam into at least four ~~N~~ sub-beams;

means for imparting a different time delay to each of the ~~N~~ sub-beams,

means for imparting a distinctly different polarization state to each of the sub-beams,

means for recombining the sub-beams with different polarization states into one recombined optical beam to be passed through the optical device and to be interfered with the reference beam in the interferometer to form an interfered beam containing modulations at beat frequencies associated with the different polarization states, and

means for analyzing the interfered beam in the frequency domain to obtain signal levels of the beat frequencies at the different polarization states from which polarization mode dispersion (PMD) or polarization dependent loss (PDL) is calculated .

8. (new) The apparatus according to claim 7, wherein the at least four sub-beams comprise four sub-beams with four different polarization states comprising linear horizontal, linear diagonal, linear vertical, and right-hand circular.

9. (new) The apparatus of claim 4, further comprising an analyzer for calculating polarization mode dispersion (PMD) or polarization dependent loss (PDL) of the device under test based on amplitudes of the frequency components of the output light signal associated with each one of the different polarization states.

10. (new) The method according to claim 6, wherein the at least four sub-beams comprise four sub-beams with four different polarization states comprising linear horizontal, linear diagonal, linear vertical, and right-hand circular.

11. (new) The method according to claim 6, further comprising filtering spurious beat frequencies separate from the beat frequencies associated with the different polarization states.

12. (new) A device for determining optical properties of a device under test comprising:
a tunable light source for providing a light beam, the beam having a wavelength that varies periodically through a range of wavelengths at a sweep frequency rate;
a first beam splitter for splitting the light beam into a signal beam and a reference beam,
a second beam splitter for splitting the signal beam into at least four sub-beams;
polarizing optics for imparting a distinctly different polarization state to each of the sub-beams in order to associate each of the sub-beams with a different polarization state;
a beam combiner for combining the sub-beams into a single optical beam for input to the device under test;
an interferometer for interfering the single optical beam with the reference beam to obtain an output light signal, having an amplitude which varies in time; and
a detector for detecting the output light signal and resolving the output light signal into frequency components thereof, and for calculating polarization mode dispersion (PMD) or polarization dependent loss (PDL) of the device under test based on amplitudes of the frequency components associated with the different polarization states;
wherein the time delay for each the sub-beams is selected such that a unique frequency component of the output light signal is associated with each one of the different polarization states.

13. (new) The apparatus according to claim 12, wherein the at least four sub-beams comprise four sub-beams with four different polarization states comprising linear horizontal, linear diagonal, linear vertical, and right-hand circular.

14. (new) The apparatus according to claim 12, further comprising a filter for filtering spurious frequencies separate from the frequencies associated with the different polarization states.